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Transverse Single Spin Asymmetry for Inclusive and Diffractive Electromagnetic Jets at Forward Rapidity in $p^\uparrow+p$ Collisions at $\sqrt{s} = 200$ GeV and 510 GeV at STAR

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There have been numerous attempts in the last couple of decades to understand the origin of the unexpectedly large transverse single spin asymmetry (A_N) of inclusive hadron production at forward rapidities observed in $p^\uparrow+p$ collisions at different center-of-mass energies (\sqrt{s}). The current theoretical framework to explain such a puzzle includes the twist-3 contributions in the collinear factorization framework, and the transverse-momentum-dependent contributions from the initial-state quark and gluon Sivers functions and/or final-state Collins fragmentation functions. However, there are indications that the large A_N might come from diffractive processes, according to the previous analyses of A_N for forward π^0 and electromagnetic jets in $p^\uparrow+p$ collisions at STAR [1]. The STAR Forward Meson Spectrometer (FMS) is an electromagnetic calorimeter, which can detect photons, neutral pions, and eta mesons, with a pseudorapidity coverage of $2.6 < \eta < 4.2$. In 2015 and 2017, STAR collected large $p^\uparrow+p$ data sets at $\sqrt{s} = 200$ GeV and $\sqrt{s} = 510$ GeV, which provide a great opportunity to measure A_N for inclusive and diffractive electromagnetic jets. In this talk, we will present the preliminary results and analysis updates on A_N for inclusive and diffractive electromagnetic jets in the FMS at $\sqrt{s} = 200$ GeV and 510 GeV. Also, we will present the comparison of A_N between inclusive and diffractive electromagnetic jets.

[1] (STAR) J. Adam et al., Phys. Rev. D 103, 092009 (2021)

Submitted on behalf of a Collaboration?

Yes

Participate in poster competition?

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